CLAIMS

We claim:

1. An oxide based ceramic matrix comprising:

a sol-gel matrix comprising from about 10 wt% to about 25 wt% of metal oxide solids; and

alumina particles;

wherein the sol-gel matrix comprises from about 40 wt% to about 70 wt% of the matrix and the alumina particles comprise from about 30 wt% to about 60 wt% of the matrix.

2. The ceramic matrix of Claim 1 wherein the sol-gel matrix is selected from the group consisting of alumina sol, alumina-coated silica sol and silica sol.

3. The ceramic matrix of Claim 2 wherein the ceramic matrix comprises from about 0 wt% to about 33 wt% of the silica.

4. The ceramic matrix of Claim 3 wherein the ceramic matrix comprises from about 5 wt% to about 10 wt% of the silica.

5. The ceramic matrix of Claim 1 wherein the alumina particles have a size of from about 0.1 μm to about 1.5 μm.

6. The ceramic matrix of Claim 1 wherein the ceramic matrix further comprises a filler material.

7. The ceramic matrix of Claim 6 wherein the filler material is mullite.

8. A method of preparing an oxide-based ceramic matrix comprising the steps of:

providing a sol-gel matrix, wherein the sol-gel matrix comprises from about 10 wt% to about 25 wt% of metal oxide solids;

mixing the alumina particles into the sol-gel to form the ceramic matrix wherein the alumina particles comprise from about 30 wt% to about 60 wt% of the ceramic matrix; and

if necessary, adjusting the pH to prevent gelling of the ceramic matrix.

9. The method of Claim 8 wherein the sol-gel is selected from the group consisting of alumina sol, silica sol and alumina-coated silica sol.

10. The method of Claim 8 wherein the alumina particles have a size of from about 0.1 μm to about 1.5 μm.

11. The method of Claim 8 wherein the pH of the matrix is adjusted by the addition of an acid.

12. The method of Claim 11 wherein the acid is selected from the group consisting of nitric acid, hydrochloric acid and sulfuric acid.

13. The method of Claim 8 further comprising the step of treating the mixture to form a homogeneous suspension.

14. The method of Claim 13 wherein the homogenous suspension is formed by ball milling, attritor milling, planetory milling or high-shear mixing.

15. A method of making a fiber-reinforced oxide based ceramic matrix composite comprising the steps of:

providing a sol-gel matrix, wherein the sol-gel matrix comprises from about 10 wt% to about 25 wt% of metal oxide solids;

mixing the alumina particles into the sol-gel to form a ceramic matrix wherein the alumina particles comprise from about 30 wt% to about 60 wt% of the ceramic matrix;

adjusting the pH to prevent gelling of the ceramic matrix, if necessary;

treating the ceramic matrix to form a homogenous suspension; and

infiltrating the homogeneous suspension into a ceramic fabric.

16. The method of Claim 15 wherein the sol-gel matrix is selected from the group consisting of alumina sol, silica sol and alumina-coated silica sol.

17. The method of Claim 15 wherein the alumina particles have a size of from about 0.1 μm to about 1.5 μm.

18. The method of Claim 15 wherein the pH of the matrix is adjusted by the addition of an acid.

19. The method of Claim 18 wherein the acid is selected from the group consisting of nitric acid, hydrochloric acid and sulfuric acid.

20. The method of Claim 15 wherein the homogenous suspension is formed by ball milling, attritor milling, planetory milling or high-shear mixing.

21. The method of Claim 15 wherein the method further comprises the steps of calcining the infiltrated preform and sintering the infiltrated preform.

22. The method of Claim 21 wherein the method further comprises the step of repeating the infiltrating step and the calcining step.